Mid-Decadal Global Land Survey: Status Update

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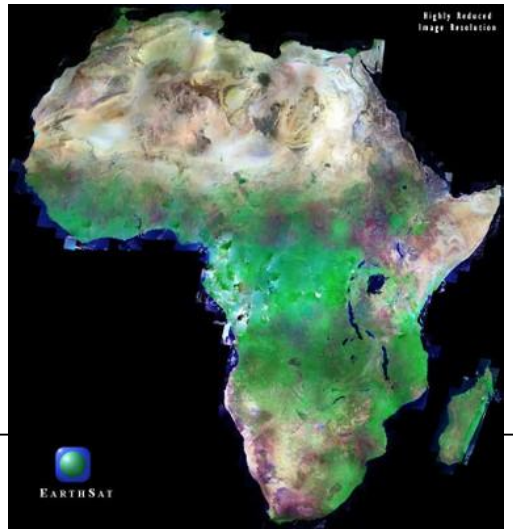
Mid-Decadal Global Land Survey (MDGLS)

Follow-on to the GeoCover orthorectified global data sets (1975, 1990, and 2000 epochs) nominally referred to as the middle-of-the decade dataset (covering 2004-2007)

- Partnership between USGS and NASA, in support of CCSP
- Support global assessments of land-cover, land-cover change, and ecosystem dynamics (disturbance, vegetation health, etc)
- Pilot project for routine global monitoring in LDCM era
- Primarily Landsat-7 ETM+ and Landsat-5 TM imagery, with ASTER and EO-1 ALI data as needed



USGS NASA

MDGLS Development

Phase 1: assure global coverage by Landsat or Landsat-like observations. Identify all candidate scenes and ingest into the USGS archive

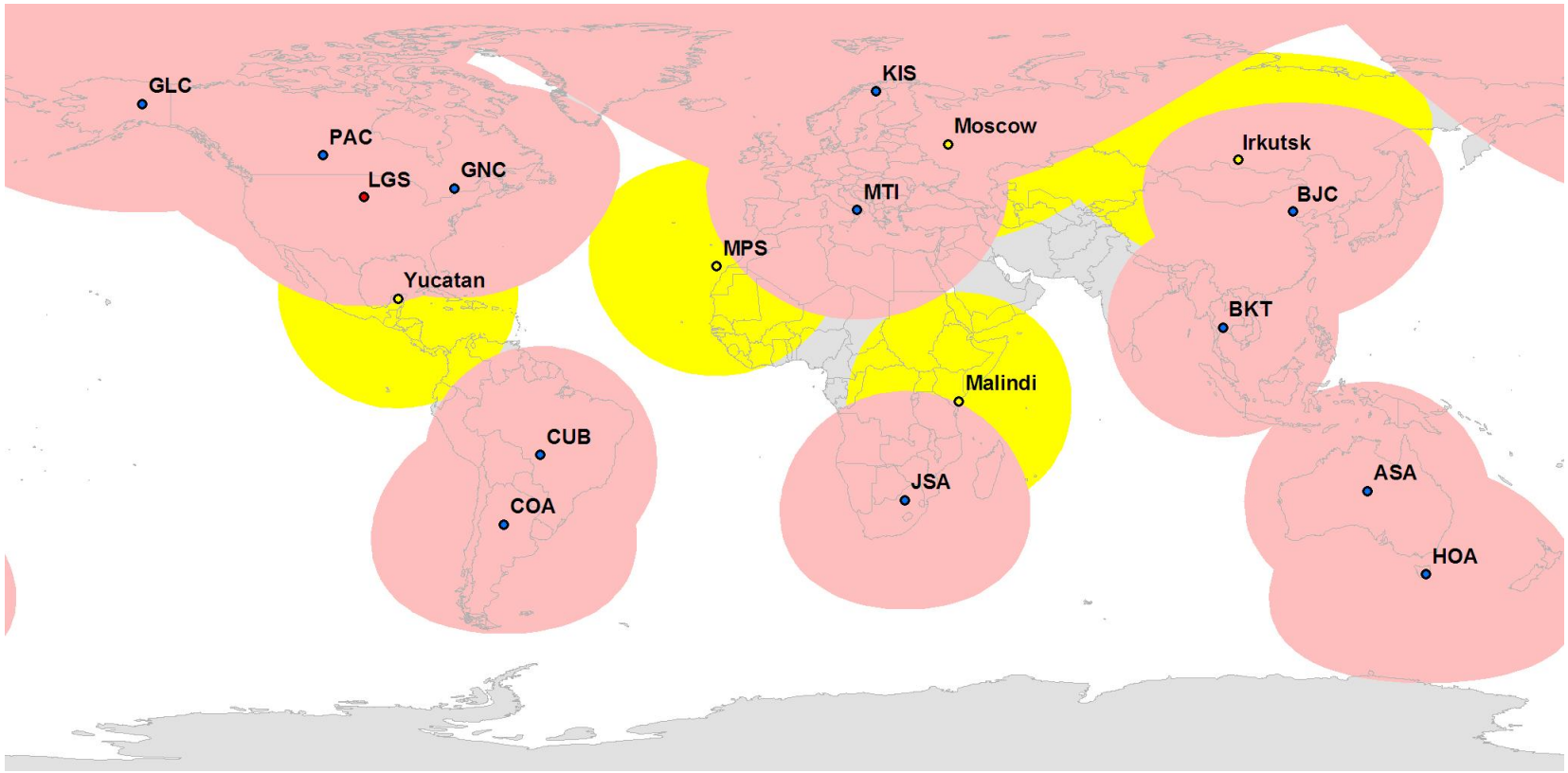
Phase 2: Process selected data into an ortho-rectified dataset compatible with previous surveys

- orthorectification
- gap filling for Landsat-7
- EROS to carry out processing

Phase 3: Develop LCLUC products. Analyze data set to quantify trends in land cover and vegetation dynamics

New Developments

- Phase I Update
- Analysis of Geocover 2000 geodetic problems
- LASSI Scene Selection Tool
- Production Schedule and Funding
- Phase III Science Initiative
- The Next Decadal Survey (2010)



Landsat "International Cooperator" Ground Stations
Temporary "Campaign Stations" for MDGLS

Phase I Status

Landsat-5:

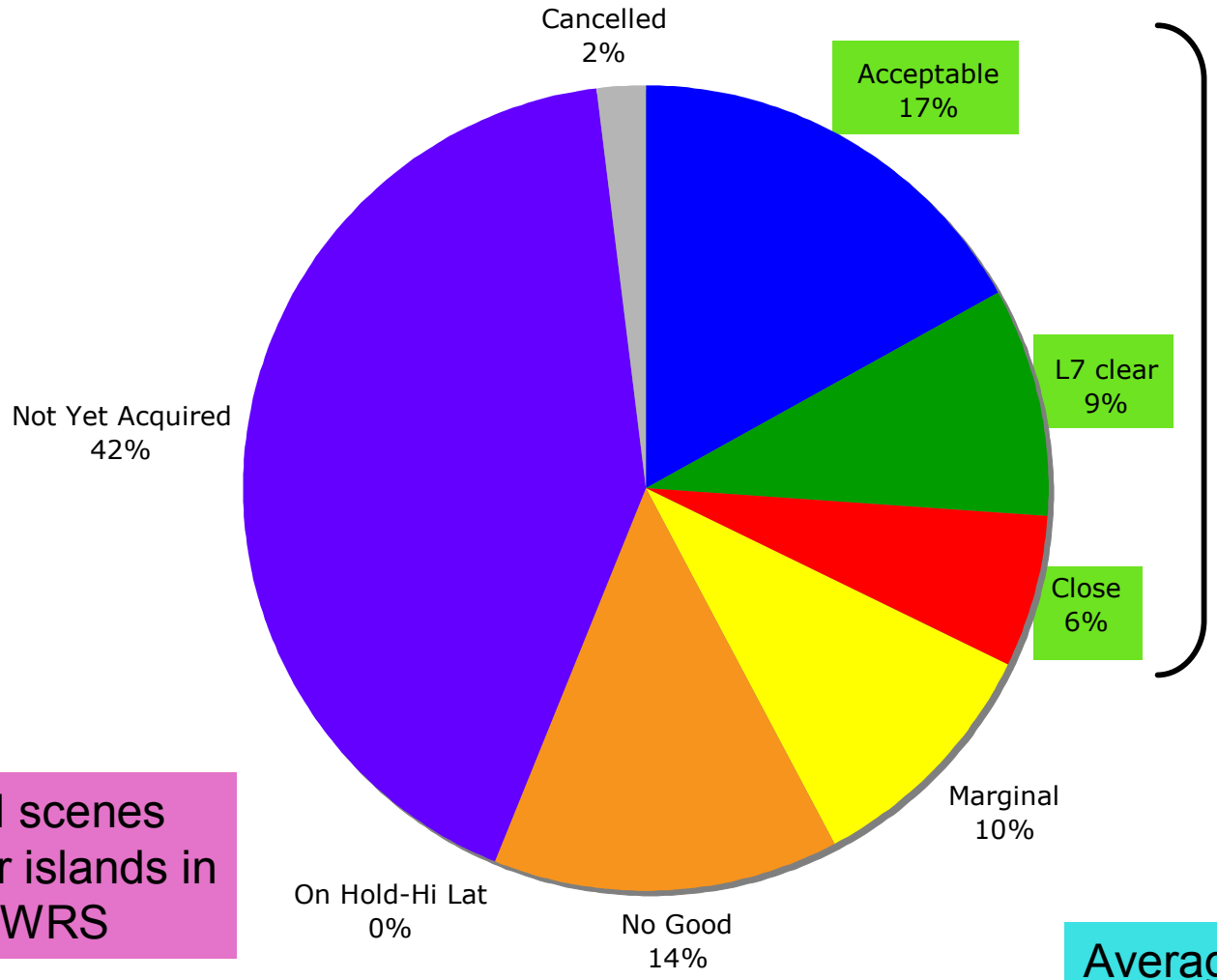
- IC browse data being ingested (all IC's participating except for Eurimage
- Campaign data received from Mas Palomas, Moscow, Irkutsk
- Yucatan station online
- Malindi questionable

Landsat-7

- North American browse inspections finished… where next?

EO-1 ALI acquisitions continuing

EO-1 acquisitions for MDGLS as of 5 June 2007



32% could be considered "good enough"

642 ALI scenes to cover islands in 282 L7 WRS

Average ACCA for Acceptable scenes is 40%

Geocover 1975-2000 Geodetic Issues

Although the Geocover product met the per-block accuracy requirement (<60m RMSE), there remain significant errors (>100m) on the per-scene and per-pixel level

1. Geocover used 1km DEM for some parts of globe, not SRTM
   - relative error between MDGLS and Geocover
   - predictable from current analyses

2. DTED 90m vs. SRTM 90m digital topography
   - relative error between MDGLS and Geocover
   - unknown distribution at this point

3. Spatially disconnected bundles
   - absolute geodetic error

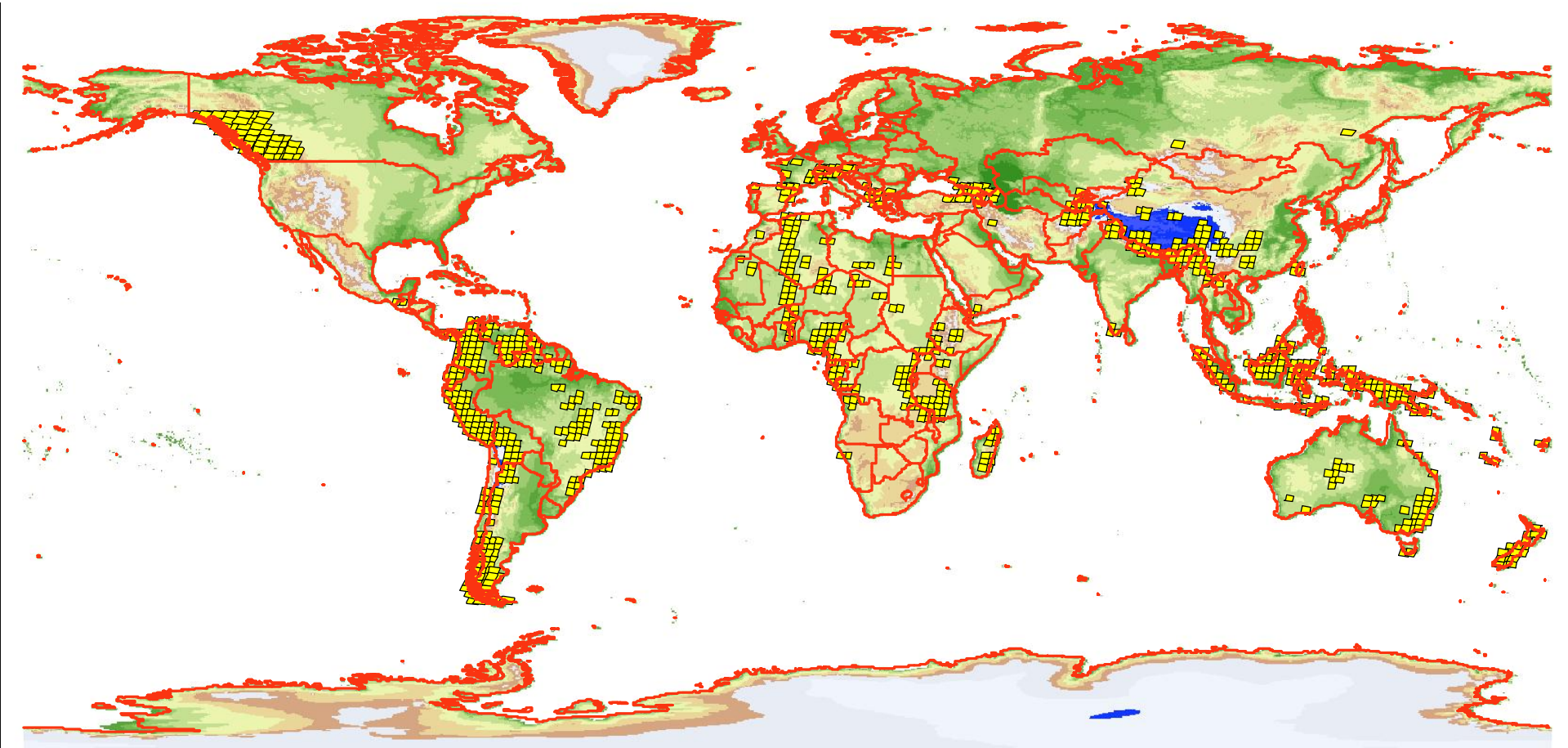
4. Lack of sufficient ground control
   - absolute geodetic error

Predicted Topographic Errors

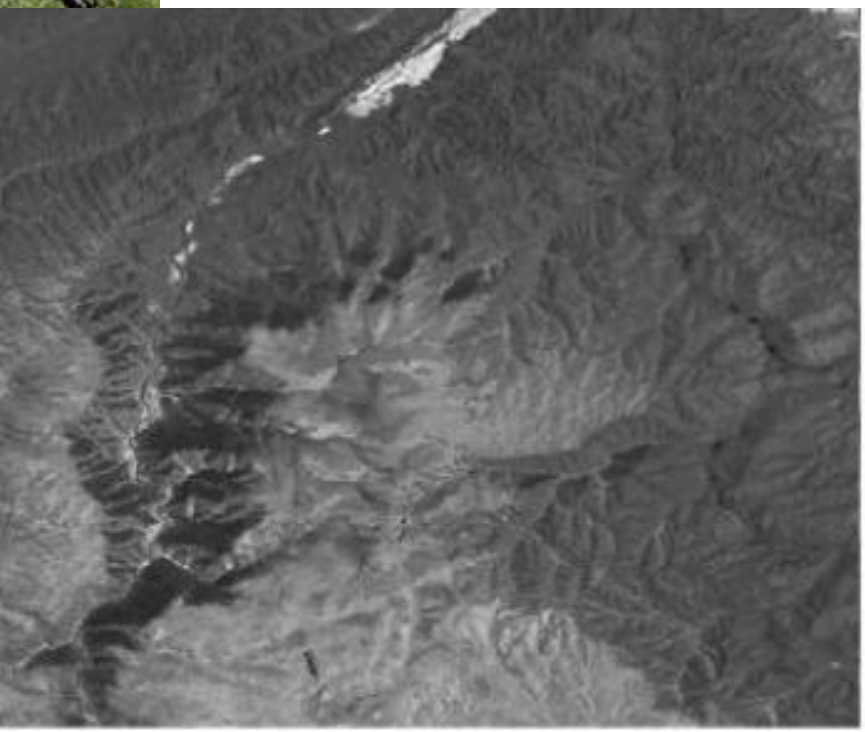
Total Scenes = 886

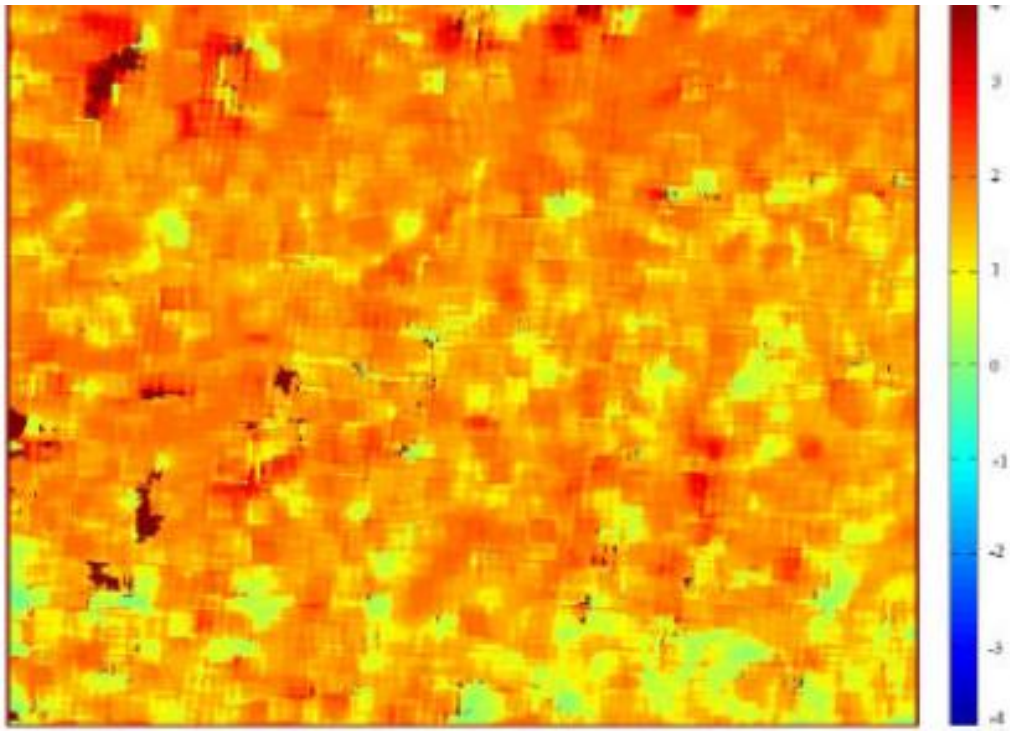
Thresholds:

1. Reprocess all Geocover scenes where >0.5% (TBR) of the area has >30m (TBR) error
2. Reprocess all Geocover scenes for which the maximum error is > 100m (TBR)



Block Geometry Boundary, Central China





Geocover Reprocessing Proposal

MDA Federal has proposed reprocessing the entire Geocover dataset (1975, 1990, 2000) using SRTM DEM and additional ground control (Landsat-7 definitive ephemeris)

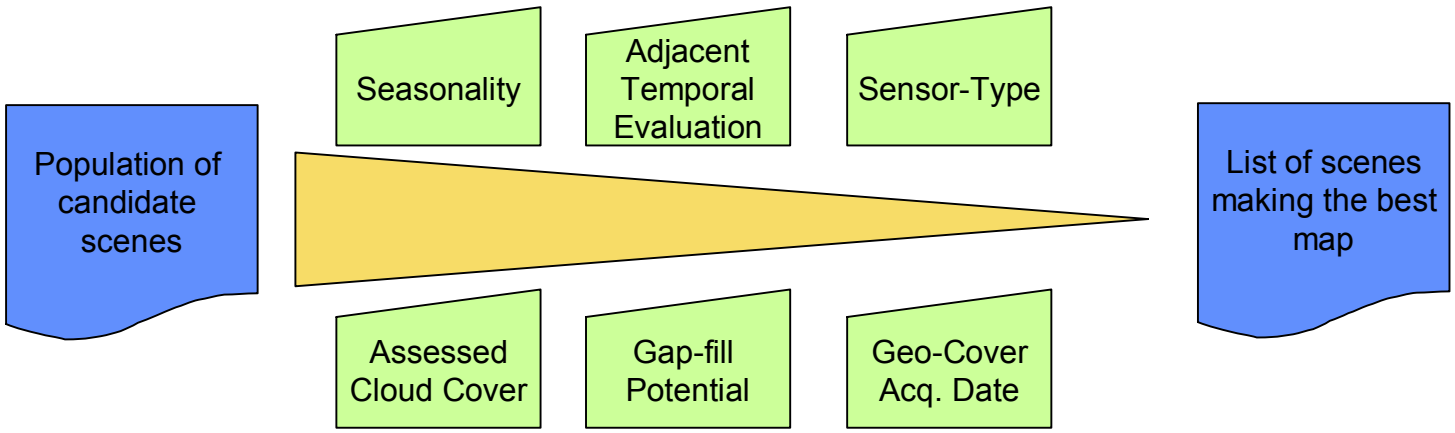
Fixes both relative and absolute geodetic errors, and establishes "best" geodetic baseline for the coming decade including processing Geocover/MDGLS, Decadal Survey (2010), LDCM processing, and other USGS land products

6-9 month completion from contract initiation

Costs (~1 M$) to be split between USGS, NASA, NGA

Large Area Scene Selection Interface (LASSI)

Optimization algorithm to ingest a metadata archive and select the best overall data set based on multiple weighting factors



List of Weighting Criteria

NDVI Base Image (W_ndvi_B)
ACCA score Base Image (W_acca_B)
NDVI Fill Image (W_ndvi_F)
ACCA score Fill Image (W_acca_F)
Difference between Acquisition Date of L7 pair (W_difAD_P)
Gap Phase Statistic (W_cover_P)
Difference between Acquisition Date N/S (W_difAD_NS)
Difference between Acquisition Date E/W (W_difAD_EW)
Difference between Day of year N/S (W_difDY_NS)
Difference between Day of year E/W (W_difDY_EW)
Preference towards using L5 (W_useL5)
Preference towards using L7 (W_useL7)

USGS MDGLS Processing

April 2007: USGS issues RFI for commercial participation

- no significant interest from industry
- EROS will carry out the orthorectification of MDGLS

EROS Bulk Processing Capability

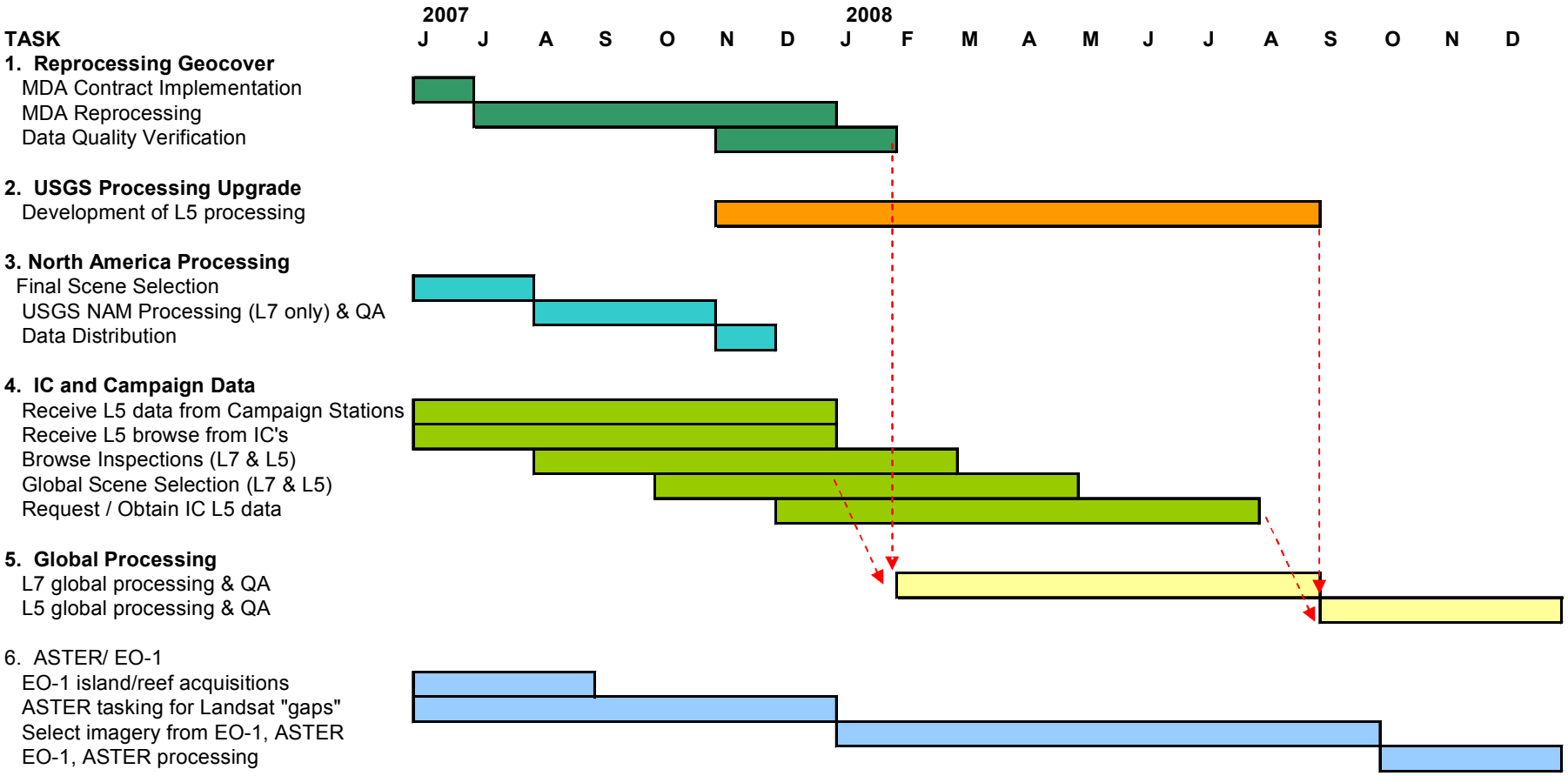
- Landsat-7: ready and on-line in May
- Landsat-5: pushed back to Fall 2008

North American ETM+ processing currently waiting on final scene selection from LASSI

- recommend beginning processing of US and Eastern Canada before reprocessed Geocover is available

Two-year Funding Profile Agreed by NASA and USGS

Draft MDGLS Implementation Schedule



NAM L7 cannot be processed before final scene selection
Global L7 cannot be processed before Geocover reprocessing and regional scene selection
Global L5 cannot be processed before regional scene selection, L5 IC data receipt, and USGS bulk processing capability

USGS NASA

Mid-Decadal Global Land Survey (MDGLS)

Phase I: Identify and Acquire L5 and L7 Data

Phase II: Process MDGLS Data

Phase III: Analyze MDGLS Dataset for Land Cover/ Land Cover Change

Community Recommendations

Meeting on Phase III Strategy – Feb 27-28, 2007 in Annapolis MD. Findings include:

MDGLS critically important for LC Science and Assessments

Highest priority for global estimates of land cover change

- forest cover change, disturbance
- irrigated agriculture extent
- global standing water
- arctic hydrology (bogs, permafrost)
- urbanization
- focus on products that meet societal needs

Distributed implementation ok, but harmonization essential

Open archive would advance science utility of MDGLS

Community Recommendations (2)

FAO LCCS (Land Cover Classification Scheme) is appropriate for MDGLS, with some modification

- reduce emphasis on land use
- need comparable effort for land cover change products

Validation of land cover change needs to be integrated into Phase III from the start

- work with GOFC Validation Team and CEOS CVWG
- validation of land cover *change* a new topic

Phase III activities represent a pathfinder for 2010 assessment, and annual assessments in LDCM era

Phase 3 Funding Prospects

- **The ROSES-2007 NASA LCLUC call gives opportunity for investigators to develop LCLUC products from both GEOCOVER & MDGLS**
  - Expect 3-4 selected projects, 300-400K/yr
  - Anticipated starts in Mar'08
- **Next year an additional call to complement what's needed based on the 2007 selections**

Toward 2010 Global Land Survey

Put plans in place *now* to start collecting data in 2009

Obtain institutional buy-in *now* - recognize that costs should be lower with current processing capabilities

What if there are no Landsat assets in orbit?

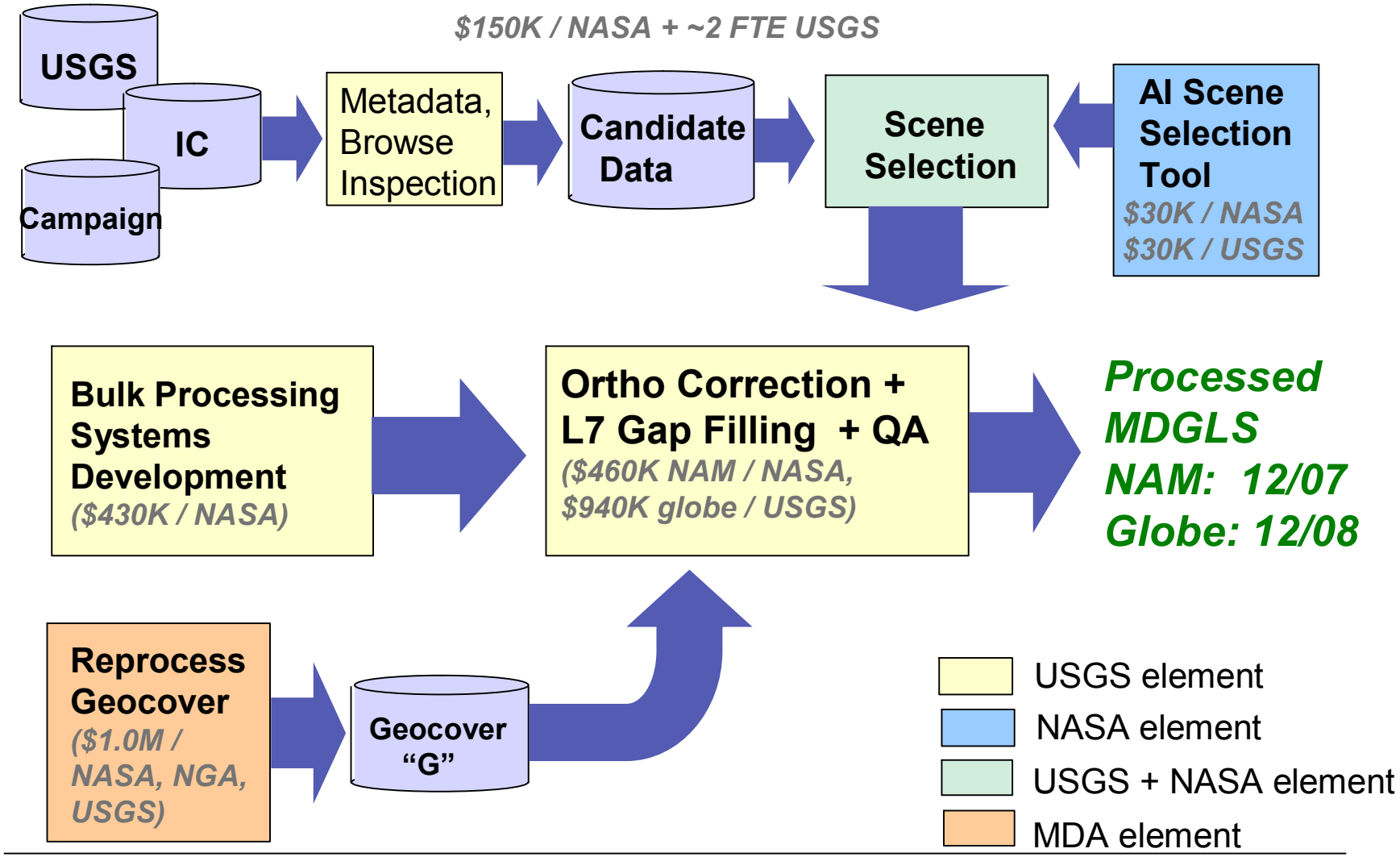
- rely on AWIFS, CBERS, other international assets
- begin plans to target ASTER

What if Landsat-5 and Landsat-7 are still operational?

- evaluate possibility of campaign stations
- multiscene compositing?
- augment capability using AWIFS and/or CBERS?

Backup

Project Flow



MDGLS Web Site (draft)
http://lcluc.umd.edu/mdgls/index.html